

Curricular Alignment: A Re-Examination

THERE IS A STORY that needs to be told. . . . It is a story about children and also about curricula—curricula transforming national visions and aims into intentions that shape children’s opportunities for learning through schooling. (Schmidt & McKnight, 1995, p. 346)

We must “[change] the question from ‘What students know and can do’ to ‘What students know and can do as a result of their educational experiences.’” (Burstein & Winters, 1994)

During the past half-century there has been a growing body of evidence supporting a fundamental educational truism: that *what* and *how much* students are taught is associated with, and likely influences, *what* and *how much* they learn. In fact, the results of several fairly recent studies suggest that, in terms of measured student achievement, *what* students are taught is more important than *how* they are taught (Alton-Lee & Nuthall, 1992; Breitsprecher, 1991; Gamoran, Porter, Smithson, & White, 1997). Over time, different terminology has been used to denote the “what” of teaching. The three terms that have generated the most research interest are “content coverage,” “opportunity to learn,” and “curriculum alignment.” Importantly, these are not just different labels for the same basic idea; there are important conceptual distinctions underlying them. These distinctions can be understood by examining Figure 1.

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Content Coverage, Opportunity to Learn, and Curriculum Alignment

Figure 1 contains three primary components of curriculum: objectives (also known in today’s vocabulary as content standards or curriculum standards), instructional activities and supporting materials, and assessments (including standardized tests). The sides of the triangle represent relationships between pairs of components: objectives with assessments (side A), objectives with instructional activities and materials (side B), and assessments with instructional activities and materials (side C).

Traditionally, the issue of the relationship between objectives and assessments (side A) has fallen under the “tests and measurement” umbrella of content validity. That is, to what extent does the test measure the important curricular objectives? This remains an important question, as evidenced by recent studies conducted by Buckendahl, Plake, Impara, and Irwin (2000), Kendall (1999), and Webb (1999).

Both content coverage and opportunity to learn, as defined by Burstein (1993), have to do with the relationship of instructional activities and materials with assessments (side C). The primary difference between the two concepts is where the analysis begins. Studies of content coverage typically begin with an examination of the instructional activities and materials (particularly the materials). The question is, “Is what we are teaching being tested?” Examples of early studies of content coverage

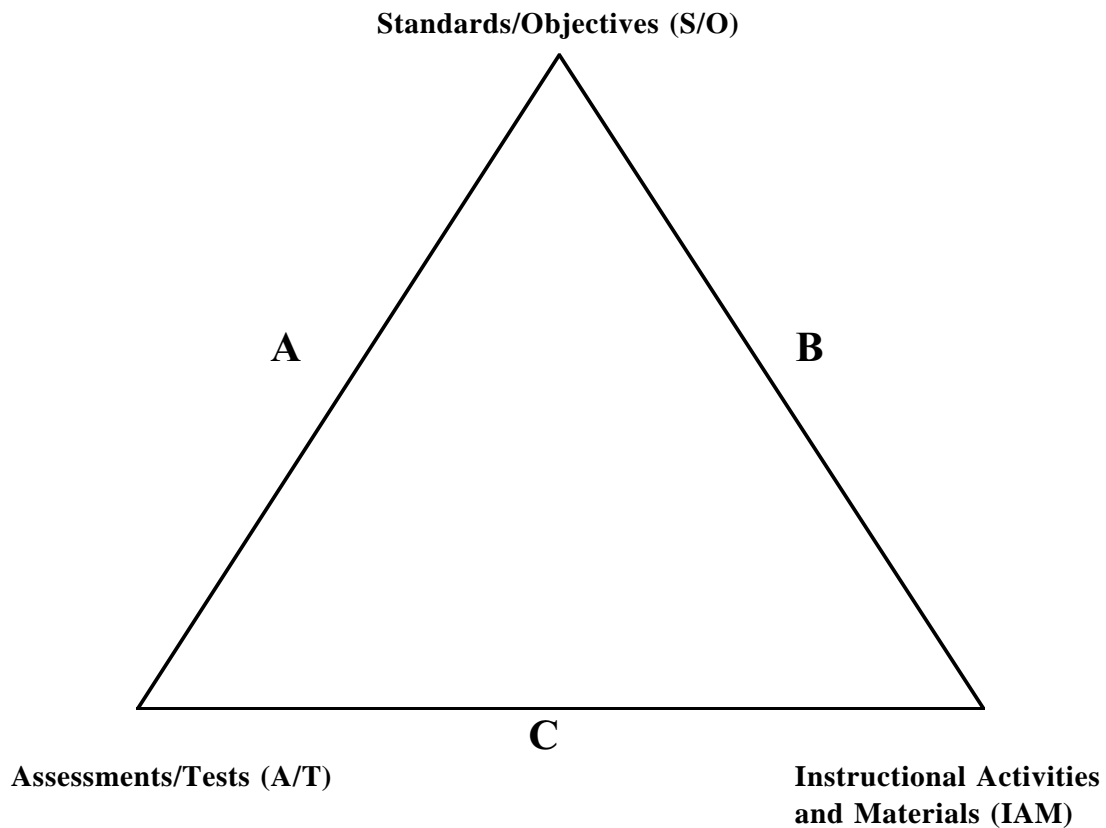


Figure 1. Relationships Among Standards/Objectives, Instructional Activities and Materials, and Assessments/Tests.

include Good, Grouws, and Beckerman's (1978) study of the relationship of the number of textbook pages covered with mathematics achievement test scores, and Anderson, Evertson, and Brophy's (1979) study of the number of basal readers completed by first-grade reading groups in relation to reading achievement test scores. More recent studies of content coverage have been reported by Elia (1994), Gamoran, Porter, Smithson, and White (1997), Kim (1993), Muthen et al. (1995), and Schmidt and McKnight (1995).

In contrast to content coverage, studies of the opportunity to learn typically begin with an examination of the assessment tasks or test items. The question is, "Are we teaching what is being tested?" Cooley and Leinhardt (1980), for example, asked teachers to estimate the percentage of their students who had been taught the minimum material necessary to pass each item on a standardized achieve-

ment test. In a related study, Leinhardt, Zigmond, and Cooley (1981) asked teachers to indicate whether each student or sample of students had been taught the information required to answer specific test items. Similarly, Winfield (1993) asked teachers to rate each of 34 test items on a five-point scale in terms of "(a) the number of times a mathematics concept was taught, (b) the frequency of review or reteaching the concept, (c) the number of settings in which the particular test format was used to teach the concept, (d) the frequency of usage of the format, (e) the extent to which the concept was emphasized in the school reading program, and (f) the teachers' perceptions of students' mastery of the concept" (p. 292).

If content validity studies focus on side A of the triangle depicted in Figure 1, and content coverage and opportunity to learn studies focus on side C of the triangle, then two questions remain.

First, what about side B of the triangle? Second, where does curriculum alignment fit into all of this? With respect to the first question, there have been several studies of the relationship of objectives to instructional activities and materials. However, no general term has been used to group these studies. Ippolito (1990), for example, examined the relationship between instructional materials and “criterion objectives” (p. 1). Similarly, NC HELPS (1999) focused on the way the curriculum was taught to ensure that it was consistent with the content of the curriculum as specified in the North Carolina “Standard Course of Study.” Finally, Pickreign and Capps (2000) compared the “geometry language” used in K-6 textbooks with the language found in mathematics standards documents.

With respect to the second question, curriculum alignment is represented by the entire triangle in Figure 1. That is, curriculum alignment requires a strong link between objectives and assessments, between objectives and instructional activities and materials, *and* between assessments and instructional activities and materials. In other words, content validity, content coverage, and opportunity to learn are all included within the more general concept of “curriculum alignment.”

Over the years, researchers have come to realize the importance of designing studies of sufficient complexity to examine the complete set of interrelationships included in Figure 1. However, only a few such studies currently exist. One noteworthy example, a study conducted by Breitsprecher (1991), examined the relative effects of two instructional activity variables (verbal mediation and feedback monitoring) and two levels of content validity (high and low) on student achievement. The results of the study suggest that all three variables—verbal mediation, feedback monitoring, and content validity—were significantly related to student achievement. However, content validity exerted a slightly greater influence than either of the instructional activity variables.

A Framework for Analyzing Curriculum Alignment

Although there are several methods used to collect data on curriculum alignment (Harskamp & Surhre, 1994; Winfield, 1993), relatively few

analytical frameworks exist for making sense of the data collected from curricular alignment studies. Without an appropriate framework, the interpretation of the data remains rather problematic. Consider, for example, questions often asked of teachers in curricular alignment studies:

- What percent of students have been taught the minimum material needed to pass this item? (Cooley and Leinhardt, 1980)
- To what extent is this item/objective emphasized in the school mathematics curriculum for fourth grade? (Winfield, 1993)
- Have you taught the mathematics material needed to answer the item correctly? If you have not taught it, was it because (a) the topic had been taught the prior year, (b) the topic will be taught later, (c) the topic is not in the school curriculum at all, or (d) the topic was not taught for other reasons? (McDonnell, 1995)

Terms and phrases such as “minimum material,” “mathematics material,” “topic,” and “item/objective” are certainly open to multiple interpretations.

A few attempts have been made to design appropriate analytic frameworks (see, for example, Webb, 1999). Gamoran and his colleagues (1997) developed one of the most comprehensive frameworks in this regard. Their framework consists of 10 general areas of mathematics, with each area divided into 7-10 specific topics, and six levels of “cognitive demand.” Overall, this framework “yielded 558 specific types of content that might have been taught and/or tested” (p. 329). Although this framework clearly moves us in the right direction, it suffers from at least three major problems. First, with 558 cells, it is too cumbersome to be useful to most teachers. Second, it is likely to result in an underestimate of curriculum alignment. For example, Gamoran and his colleagues found that only 19 of the 558 cells were included on the primary test they examined. This initial finding led them to a more detailed examination of the cells that were included on the test. Third, the framework is limited to mathematics. Thus, similar alternative frameworks would be needed for all other subject matters.

The Taxonomy Table is a useful framework for estimating curriculum alignment in all subject

matters at virtually every grade or school level. It addresses each of the three problems associated with the Gamoran et al. framework. First, it contains 24 cells (not 558). Furthermore, as illustrated by the vignettes included in the revised Taxonomy volume and the Ferguson and Byrd articles (this issue), teachers can use the framework to examine and enhance curriculum alignment. Second, because alignment is estimated in terms of the relationships of objectives, instructional activities and materials, and assessments with the Taxonomy Table, rather than with each other, the alignment process (a) focuses quite directly on student learning and (b) yields reasonably valid estimates of alignment. Third, as mentioned earlier, the Taxonomy Table is generic. By replacing topics with types of knowledge, the Taxonomy Table can be used with all subject matters.

Using the Taxonomy Table to Estimate Curriculum Alignment

The vignettes included in the revised Taxonomy volume and the articles written by Ferguson and Byrd (this issue) illustrate quite nicely the process used to estimate curriculum alignment with the aid of the Taxonomy Table. Before the process is described, it must be emphasized that alignment estimates using the Taxonomy Table are based on curriculum units or entire courses, not individual lessons. Thus, the analysis involved a group of objectives, a variety of instructional activities, and, generally, more than one assessment (both formal and informal). Having said this, the alignment process involves four steps.

First, each objective is placed in its appropriate cell or cells of the Taxonomy Table. The verbs and nouns included in the statement of the objective are used to place the objective in the proper cell. Second, each instructional activity (and accompanying support materials) is similarly placed in its appropriate cell, based once again on clues provided by verbs and nouns included in the description of the activity. Third, using clues from included verbs and nouns, each assessment task (whether it be a performance assessment or one of a series of test items) is placed in its appropriate cell. In the case of traditional tests, each item is considered an assessment task and placed appro-

priately. Fourth, the three completed Taxonomy Tables, one each derived from the analysis of the objectives, instructional activities and materials, and assessments, are compared. Complete alignment is evidenced when there are common cells included on all three completed Taxonomy Tables. That is, the objective, instructional activities and materials, and assessments all fall into the same cell (e.g., understand conceptual knowledge). Partial alignment also exists. For example, the objective, instructional activities and materials, and assessments may all fall into the same row (i.e., type of knowledge), but differ in terms of the column in which they are classified (i.e., cognitive process category). Similarly, the objective, instructional activities and materials, and assessments may all fall into the same column, but differ in terms of the row in which they are classified. Partial alignment provides potentially useful diagnostic information to teachers who want to improve their curricular alignment. Moving an instructional activity from an emphasis on *factual knowledge* to an emphasis on *procedural knowledge*, or from *understand* to *analyze* may be worth the effort if alignment is substantially improved.

Before concluding, two final points must be made. First, there is increasing evidence that estimating curriculum alignment based on both knowledge and cognitive processes is superior to other methods of estimating alignment. This research is summarized concisely by Gamoran and his colleagues (1997). "Clearly, to predict student achievement gains from knowledge of the content of instruction, a micro-level description of content that looks at cognitive demands by [type of knowledge] is the most useful approach considered to date" (p. 331).

Second, alignment, using the Taxonomy Table, is based on considering what teachers intend in terms of student learning. This is particularly important to keep in mind when analyzing instructional activities. When examining instructional activities, one must ask, "What is the student supposed to learn from his or her participation in this activity? What knowledge is to be acquired or constructed? What cognitive processes are to be employed?" Without answers to these questions, it is impossible to properly classify instructional activities in terms of the Taxonomy Table.

The Value of Curriculum Alignment

Even if the reader is convinced that the Taxonomy Table is a useful tool for estimating and increasing curriculum alignment, one question remains: Why should teachers be concerned about curriculum alignment? At least four answers to this question can be given.

The first is foreshadowed by the quotations with which this article began. Leigh Burstein was correct. We need to be more concerned with what students have learned as a result of their schooling experience than with what they know and can do regardless of the source of that knowledge or those skills. Bill Schmidt and Curtis McKnight also were right. Providing or denying opportunities to learn results in a very different education for different students. In summarizing the results of their research in New Zealand, Adrienne Alton-Lee and Graham Nuthall stated: "Our exploratory studies revealed that the curriculum excluded or marginalized people by race and gender . . . and that these processes led to different experiences for different . . . students" (p. 6). Or, in the words of Linda Winfield, opportunity to learn "emphasizes the importance of instruction and school factors in student achievement, and it avoids the 'blame the victim' mentality which focuses solely on students" (p. 307). In this regard, there is increasing evidence that the impact of opportunity to learn on student achievement is considerably greater for minority students than for their "advantaged" counterparts (Elia, 1994).

A second reason for the importance of curriculum alignment is that proper curriculum alignment enables us to understand the differences in the effects of schooling on student achievement. This is clearly evidenced by the research reported by Gamoran and his colleagues. The study focused on the success of so-called "transition" mathematics courses in California and New York. These transition courses were designed to bridge the gap between elementary and college-preparatory mathematics and to provide access to more challenging and meaningful mathematics for students who enter high school with poor skills. Based on their study, Gamoran et al. conclude that: "More rigorous content coverage distinguishes college-preparatory math classes from general-track math classes, and it also shows that, consistent with previous

research, students learn more in the college-preparatory classes" (p. 333). Consequently, "low-achieving high school students are capable of learning much more than is typically demanded of them. The key is to provide a serious, meaningful curriculum: 'hard content for all students'" (p. 336).

A third reason for the importance of curriculum alignment is that poorly aligned curriculum results in our underestimating the effect of instruction on learning. Simply stated, teachers may be "teaching up a storm," but if what they are teaching is neither aligned with the state standards or the state assessments, then their teaching is in vain. This is the educational equivalent of a tree falling in the forest with no one around . . . no demonstrated learning, no recognized teaching.

A fourth, and final, reason for the importance of curriculum alignment stems from the current concern for educational accountability. Actually, *current* is probably not the correct word to use here. Over the past quarter century, the responsibility for accountability has shifted from students (and their home backgrounds) to schools. Regardless of the focus, however, curriculum alignment is central to the success of accountability programs. More than 20 years ago, the NAACP filed a lawsuit against the state of Florida (*Debra P. v. Turlington*, 1979) arguing that it was unconstitutional to deny high school diplomas to students who had not been given the opportunity to learn the material covered on a test that was a requirement for graduation. The court placed a four-year moratorium on administration of the test for diploma denial, arguing that this additional period of time was necessary to allow students to have an opportunity to learn the necessary knowledge and skills. Although the emphasis has shifted from student to school, the issue has not changed substantially. As Baratz-Snowden (1993) has asserted: "If students are to be held accountable for their learning, then schools must be held accountable as well by demonstrating that they provide students with opportunities to learn to meet the standards that have been set" (p. 317).

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